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Integrating Six Sigma and ITIL® for Continual Service Improvement

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1 Executive Summary

The introduction of formal ITIL processes into an organization can be, and normally is, a very time-consuming, expensive and sometimes organizationally exhausting task. Many organizations, upon completing their process implementation projects, breathe a sigh of relief and presume that the processes will go on forever. Sadly, that is not the case – without continual attention to the processes they almost surely will not stay abreast of the changing needs of the organization and process performance shortfalls will not be addressed.

To address this practical and operational issue, the current version of the ITIL framework defines a service lifecycle stage – Continual Service Improvement (CSI) – intended to measure and improve processes and services. Through CSI process and service owners will remain focused on poor performance and are prompted to take timely remedial action to address these issues and challenges. Although the ITIL publication *Continual Service Improvement* offers a generic improvement approach, the quality practitioner may need a bit more guidance than the 7-Step Improvement Process. Fortunately, multiple frameworks are available in the public domain to integrate well defined quality practices into an improvement schema.

This paper discusses an approach using one such well-established process improvement methodology – Six Sigma. The Six Sigma methodology is particularly compatible with ITIL. A basic premise of Six Sigma is a focus on improvement efforts surrounding process, product or service performance that impacts the ultimate customer. This relationship is very similar to the relationship of services to the business and how those services are managed via the ITIL processes.

In this paper we review some basic ITIL principles, discuss how those principles apply to Six Sigma, and how Six Sigma can practically be applied to Continual Service Improvement efforts. Finally, we offer some practical tips for applying Six Sigma to improve ITIL processes and services in general.

This paper will be useful to all ITIL practitioners, process owners and managers. It will be of particular interest to CSI managers, reporting analysts, process improvement program managers, problem managers, service level managers, service owners and directors.

As we will explore throughout the paper, Six Sigma can have broad applicability to support the ITIL processes. As an example, the authors have worked with an organization which employed the Design for Six Sigma (DMADV) method to help in designing and implementing their ITIL processes. For this organization, a critical component of the process design was an assurance that the processes would function at a high level of quality when implemented.. We have also observed organizations using the DMAC approach when designing metrics to support Problem Management or their Continual Improvement initiatves.

2 Service Management and the need for improvement

One of the key improvements to ITIL version 3 (V3) is the addition of the Continual Service Improvement (CSI) practice. IT organizations have been making service improvements for many years, but they have often been in a reactive mode. In many cases, the improvement effort has used cost reduction (rather than improving service value) as the driver for the initiative. For instance, when there is a failure, typically a project is formed to address the failure – after the fact. CSI is a formal proactive practice that addresses improvement opportunities for IT services, Service Management processes and the service lifecycle. The proactive nature of CSI is one of anticipating service related issues and addressing them before they become an issue for the customer. Additionally, CSI can identify areas for increased service or process efficiency and effectiveness, which increase the value to the customer and/or reduce the cost of delivering the service.

There are multiple quality frameworks available to support improvement activities. In this paper we discuss the relationship of IT Service Management (ITSM) – in particular, CSI as a practice within ITIL – with a well-understood quality improvement approach known as Six Sigma. The basis for this discussion is the relationship of the continuity of the service lifecycle and the interaction of improvement activities as the lifecycle is completed and started again.

To set the stage for our discussion, let us review some key ITSM principles that will apply directly to the relationship between ITSM, ITIL and Six Sigma.

As Figure 2.1 illustrates, CSI focuses on improving the ability of the service organization to create and maintain value for customers through improvements in the design, introduction

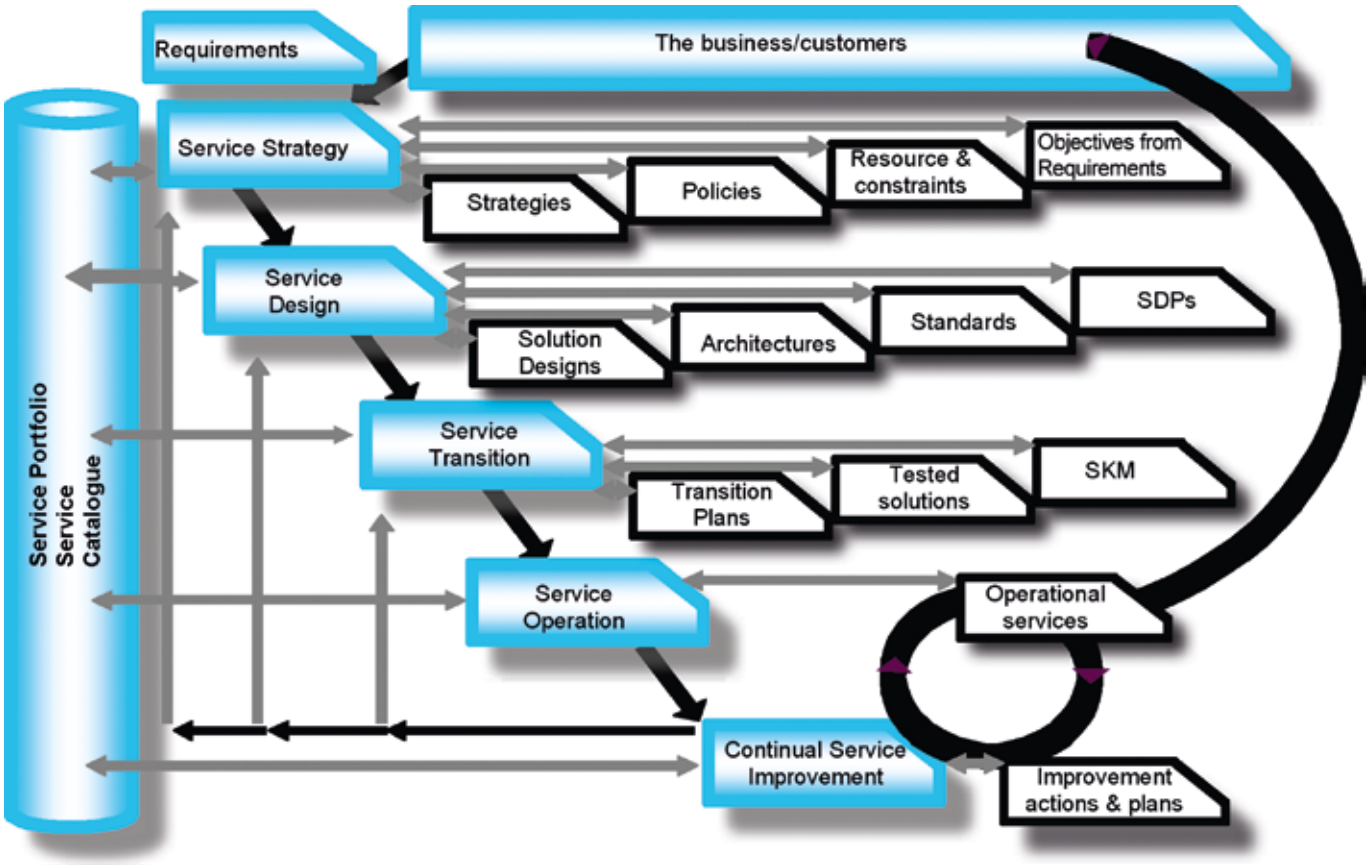

Figure 2.1 Service Portfolio spine

and operation of IT services. The CSI practice ensures that IT is continually capable of enabling business outcomes even as the dynamics of the business environment change.

One of the key drivers for process initiatives is the need to improve the service capability of the organization; but, as most service and process practitioners have come to realize, achieving the benefits from a service comes not just from the introduction of the service, but in continually revisiting the service, its performance and most importantly, the ability of the practitioners to manage service delivery.

It would be highly unlikely for an implemented process to achieve optimal performance straight away. For that reason, in conjunction with the initial implementation of a process, we must also introduce the organizational ability to monitor a process or service against established expectations; to evaluate performance variances; and to take corrective action as needed to meet performance goals or to improve performance over time. In addition, services, and the processes that support them, must be reviewed continually to ensure the greatest balance of efficiency and effectiveness in order to support the business strategies, goals and objectives.

A valuable approach to a continual review is detailed in one of the key CSI models: the six-step Continual Service Improvement model shown in Figure 2.2.

The six steps of the Continual Service Improvement model are as follows:

1 – What is the vision? – Improvement opportunities are validated in comparison to the business and IT vision, strategies, goals and objectives.

2 – Where are we now? – In order to be able to track and measure improvement, it is important to create an initial baseline of how services are currently being delivered and how effective and efficient Service Management processes are, as well as the effectiveness of the service lifecycle itself.

3 – Where do we want to be? – Defining targets for services such as availability and reliability, and key performance indicators (KPIs) for Service Management processes, provides a means for a service organization to track progress from the baseline to the defined targets.

4 – How do we get there? – The difference between where we want to be and where we are today is a performance gap that should be addressed through a dedicated effort such as a

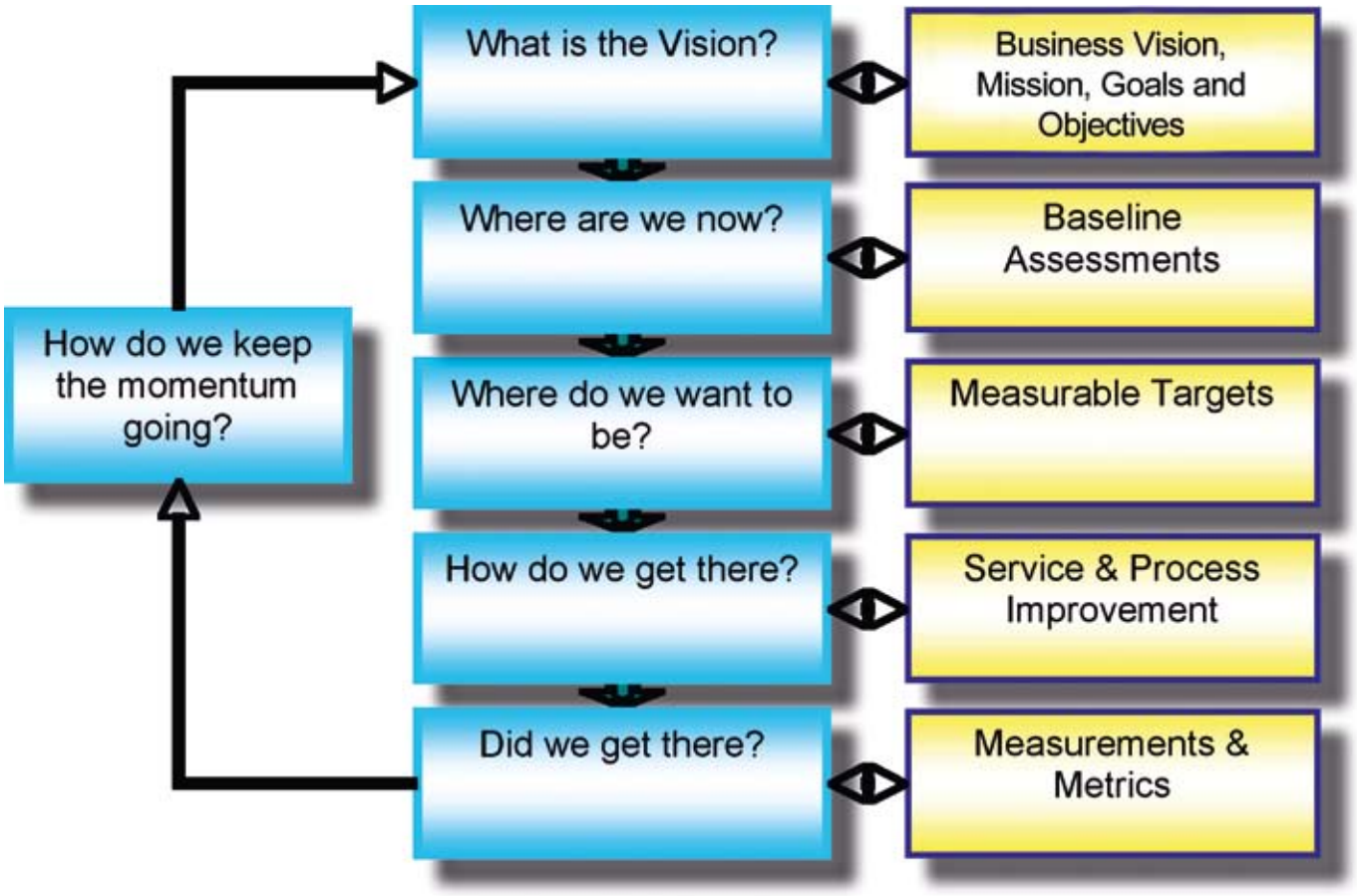

Figure 2.2 Continual Service Improvement Model

project. The gap is closed through the work of an improvement project team that is managing work on a core set of deliverables to produce the expected results.

5 – Did we get there? – To measure whether the gap is closed requires ongoing validation measurements and assessment. Were the desired outcomes achieved?

6 – Keeping the momentum going – Ensuring that changes are embedded in the organization.

An underpinning concept that lies at the heart of the ITIL process framework and the lifecycle is the definition of a service. A service is the logical representation of what a service provider – in this case, IT – assembles or produces to deliver value to a customer (the business) through support or achievement of customer outcomes. The value that the customer receives from a service can be discussed and measured through the utility (what the customer wants) and warranty (how the customer wants it delivered) of the service itself.

Another important point is the concept of the Service Portfolio and the vital investment decisions, design and development activities that must be made as part of the Service Pipeline (see Figure 2.3).

The Service Portfolio identifies what is in the service pipeline; for example, new services to be provided to the business, the published service catalogue that lists all the current services available to the business, and retired services. The value of a Service Portfolio strategy is demonstrated through the ability to anticipate change while maintaining traceability to strategy and planning.

Details of applying the Service Portfolio in Six Sigma will be discussed in Section 4.

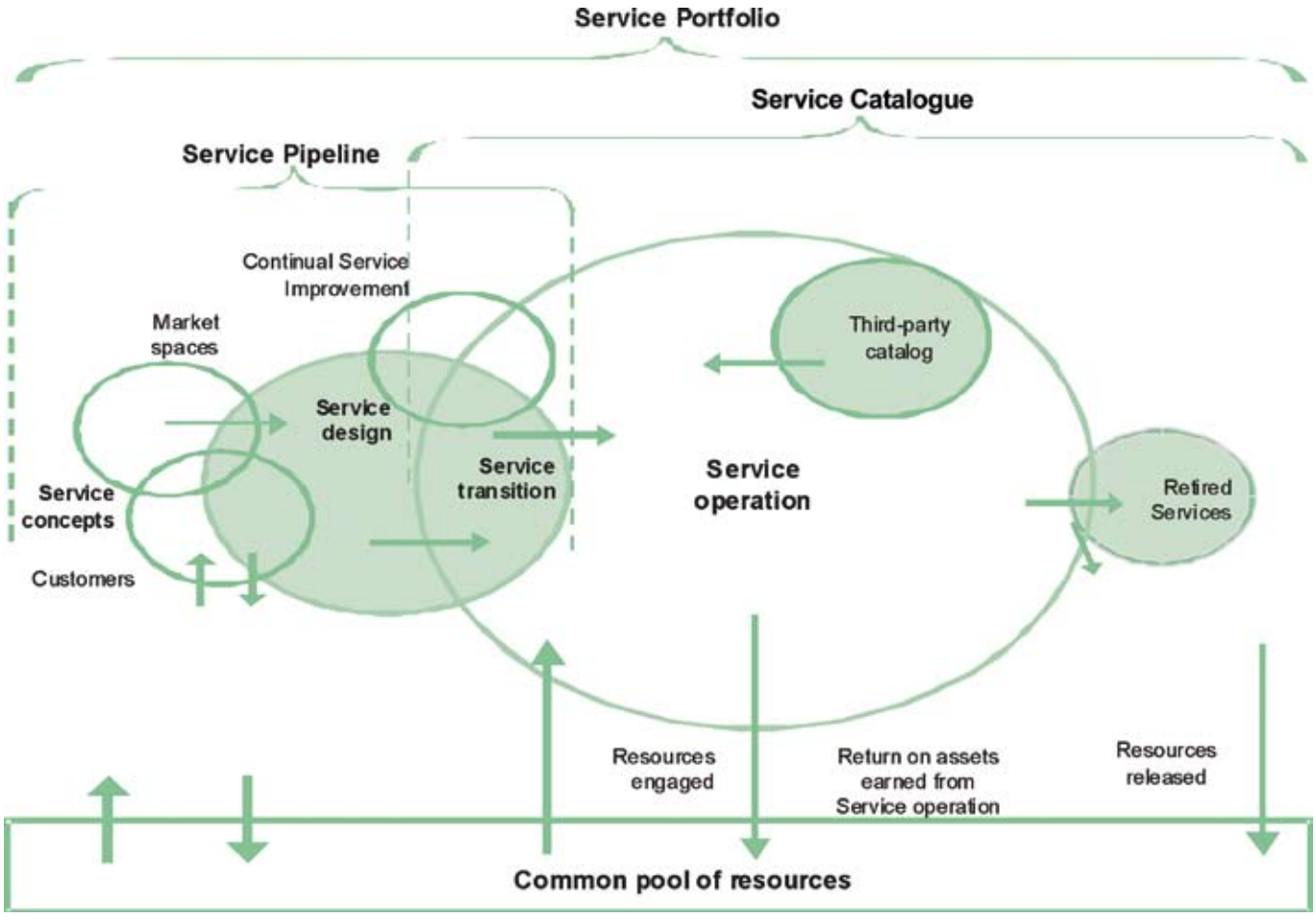

Figure 2.3 Service Pipeline and Service Catalogue

3 Overview Of Six Sigma

Quality is one of the four measurable and reportable process attributes of the ITIL *Continual Service Improvement* publication. As defined by CSI, quality is 'the ability of a process or Service to provide the intended value'. By extension, the concept of process or service quality requires meeting value expectations by instituting an ability to monitor the efficiency and effectiveness of the process or service and to improve it, if needed.

Over the last 50 years, there have been numerous quality approaches that have focused on the improvement of processes (which can be extended to include services as well). The litany of process improvement concepts includes Total Quality Management, quality control and zero defects to name a few. Many of these concepts have been espoused by leaders in the quality movement such as Shewhart, Deming, Ishikawa, and Juran, to name but a few; however, it could be argued that the basis for these efforts has been quality for quality's sake. In other words, the quality improvement goal was to root out **all** sources of error and eliminate them irrespective of their impact on customer needs or expectations. Six Sigma is a quality method that has a different focus.

Six Sigma is a quality technique developed and introduced by Bill Smith at Motorola in 1986 to identify and eliminate defects in manufacturing processes. Over time, the technique has been extended to also focus on business processes.

Since the introduction of Six Sigma at Motorola, and the company winning the Malcolm Baldrige award two years later, Six Sigma has gained a global following. The list of organizations that have embraced the practice includes General Electric, Honeywell, 3M, Air Canada, Caterpillar, Dell, EMC, Lockheed Martin, DHL, Samsung Group, Siemens AG, Starwood Hotels, TRW, McGraw-Hill Companies, the arms of the US military and numerous others. Six Sigma is attractive to global organizations requiring that parts or assemblies manufactured in one part of the world align seamlessly with others crafted elsewhere. Variance of performance, especially in the manufacturing world, is not an option.

Six Sigma and its application to business processes rely on the fact that processes can be measured, analyzed, controlled and improved. The concept of metrics and measurement is vital. The Six Sigma analytic techniques are statistically based and some mathematical acumen is needed to make sense of and apply them. Other quality approaches have also applied statistical analysis, but the key distinguishing characteristic is the focus of the analysis.

The primary differentiator between Six Sigma and other quality initiatives is that Six Sigma improvement efforts are based on the 'Voice of the Customer' (VOC). This concept provides a lens through which a quality initiative can be directed. Quality improvement efforts address those quality issues, and only those issues, that impact the customer. And it is the VOC that creates a linkage between Six Sigma and ITIL.

To expand on this further, VOC is the process of gathering customer comments regarding a process, product, etc., usually in the form of surveys. VOC statements are translated into quantitative specifications for the process. Those specifications determine what will be Critical to Quality (CTQ), such that the customer believes that the process, product, service, etc. is meeting his or her quality expectations.

For example, VOC customer comments might state that an online banking website is taking too long to load and customers are complaining that they can't conduct virtual banking. The CTQ specification might be that the web pages must load within two seconds of a customer request. The bank IT department would then monitor the number of times the web pages exceed a two-second load time – these are quality defects that could form the basis for a Six Sigma project.

So, what is Six Sigma? Six Sigma is a methodology to identify, reduce and potentially eliminate process variances or poor performance that create errors impacting the customer. Six Sigma uses a variety of statistical techniques to identify the problems and sources of error, and ultimately to design a solution that will eliminate the errors.

It is the statistical underpinning that gives Six Sigma its name. Simply put, a sigma, or one standard deviation, is a statistical measure of the dispersion of the values, in a set of data, from the average of the data. If the variation is small, the standard deviation is small and vice versa.

Although we would hope that a service would perform as designed each and every time it is executed, that will not be the case, as human or other factors come into play. In many cases, those factors are the result of errors or challenges in the service or a process supporting the service that must be addressed.

The goal of Six Sigma is to reduce the number of process defects or errors (whether manufacturing or business). A defect is a customer experience with the process, service or product that is outside of the customer expectations or requirements. Six Sigma endeavours to reduce the number of defects to below a target level by measuring the performance of the process, etc.

The variability of a process, service or product can produce defects. A valuable quality calculation is to determine the yield of the process or the number of times the process performance is free of defects. If we perform the process 20 times and there are five errors, the yield would be 75% (20 performances – 5 errors/20 performances × 100%).

We now have a way to calculate the sigma level of a process or service. The accepted way to report the number of 'sigmas' of performance is based on the number of defects per million opportunities (DPMO) – the number of chances to have a defect. To state it differently, the DPMO represents all of the service, process or product non-conforming (outside of the expected performance limits) occurrences. If we want to set a performance at a Six Sigma level that would mean that the process or service will incur no more than 3.4 DPMO.

Table 3.1 converts yield to sigma level and the corresponding sigma levels. As you can see, improving the yield (or the percentage of times the process is defect-free) increases the sigma level. For instance, a 99.4% yield equates to 6,210 defects, which is a 4.0 sigma level. While a 99.4% yield on the process might look great, the 4.0 sigma level still leaves room for substantial improvement.

Table 3.1 Converting Sigma Level to Expected Defects per Million

Sigma Level	Yield	DPMO
1.0	30.9%	690,000
2.0	69.2%	308,000
3.0	93.3%	66,800
4.0	99.4%	6,210
5.0	99.98%	320
6.0	99.9997%	3.4

Let us translate this statistical concept into some practical results. A process or product performing at 1 sigma would generate 690,000 DPMO or a yield of 30.9%. In IT terms, this would mean that for every 1,000 calls to the service desk there would be 690 incorrectly completed incident tickets or errors – not a stellar result. If we improve to 3 sigma, the number of service desk errors would fall to 66.8. Finally, a 6 sigma level of performance would result in .0034 errors for every 1,000 calls – a laudable target.

To recap this important concept, Six Sigma strives to reduce the number of process or service defects. As the process or service is improved to eliminate defects, the yield and the sigma level both increase. A process improvement team can establish improvement goals based on sigma level or yield and meet those targets using Six Sigma methodologies.

Six Sigma uses two forms of sub-methodologies to improve process quality. They are known by the acronyms DMAIC and DMADV.

DMAIC is used to improve existing processes. In other words, after a process has been implemented, the DMAIC practice can be applied to focus on a specific problem, identify the sources of error, and eliminate them. DMAIC stands for:

- **D**efine – Apply Six Sigma to a specific customer-impacting problem that will be solved via a Six Sigma project through a set of improvement or performance requirements to achieve an established goal
- **M**easure – Collect the relevant CTQ data from the process
- **A**nalyze – Apply analytical techniques to identify (prioritize) the root cause of the defects
- **I**mprove – Determine and implement solutions
- **C**ontrol – Continuously monitor the improved process.

DMADV is also known as the practice of Design for Six Sigma (DSS). DSS operates under the principle that a process, product or service can be designed with quality in mind. The DMADV practice is engaged in the following phases:

- **D**efine – Identify customer-focused design goals and requirements
- **M**easure – Identify and create measurements of CTQ factors that will impact the ultimate process or service delivery, possibly through the use of Critical Success Factors (CSFs) – customer needs, process capabilities
- **A**nalyze – Develop the design options and design capabilities such that the implemented process, service or product will achieve the design requirements
- **D**esign – Develop and optimize the service process to meet the customer requirements
- **V**erify – Test/pilot the process and transition to customer and test that the implemented process meets the target performance or customer specifications.

With the risk of oversimplifying these sophisticated practices, it is important to understand the differences between the two as well as how they might fit within organizational practices.

DMAIC can be thought of as a reactive practice. In other words, DMAIC uses or 'reacts to' the performance data of existing processes or services to target areas of concern and correct them. DMADV, on the other hand, is more proactive in nature. DMADV supports the development of a new and well-designed process that should perform far better from the outset as a result of the analytically based design process.

One additional point: to be successful, both practices must augment or be augmented by existing organizational processes and practices in order for Six Sigma to be effective. For example, DMAIC would be an excellent fit with Problem Management or CSI to focus on any process, service or lifecycle phase activity. On the other hand, DMADV would rely heavily on the processes detailed in the Service Design and Service Transition lifecycle stages.

Several elemental roles are necessary for a successful Six Sigma implementation.

The first are the various Six Sigma practitioners. The practitioners are designated by titles that reflect their experience in the practice of Six Sigma and the successful completion of Six Sigma initiatives. Every organization has its own methodology and criteria for designating and appointing the various levels.

- **Master Black Belts** – These are individuals in an organization who are the advocates of the Six Sigma practice and who serve as coaches and mentors to other Six Sigma practitioners. Typically, the Master Black Belts will have a number of Six Sigma initiatives under their supervision and will also serve to certify aspiring Black Belts. They also work to assure that the Six Sigma practice within the organization is uniformly followed and that the required disciplines are maintained.
- **Black Belts** – Black Belts are assigned to individual Six Sigma projects and spend 100% of their time on the project to achieve the expected quality improvements. To achieve Black Belt certification, candidates must demonstrate proficiency in using the methodology by completing one or more projects. Black Belts typically work under the supervision of Master Black Belts.
- **Green Belts** – Individuals in an organization who will work under the direction of a Black Belt on a Six Sigma project or may lead a Six Sigma project. Typically, Green Belts are not dedicated full-time to improvement activities and have not yet reached the level of expertise and proficiency required to be certified as a Black Belt.
- **Yellow Belts** – Some organizations also designate Yellow Belts. Yellow Belts do not have the breadth of knowledge of the Six Sigma practices as do Black and Green Belts. Instead, these individuals may be assigned to perform very targeted tasks in support of a Six Sigma project, or may lead improvement initiatives using the Deming Plan-Do-Check-Act (PDCA) methodology.

Two other organizational roles are vital to success of Six Sigma. They are:

- **Executive leadership or sponsorship** – One of the CSFs for a Six Sigma initiative is the support of senior management. Six Sigma, as an organizational discipline, will require a substantial investment of time and resources to be successful. For instance, Six Sigma practitioners will require time to complete extensive training, and Six Sigma projects are typically substantial in terms of cost. This level of organizational investment requires senior leadership to allocate scarce resources. Black Belts may shift permanently to this quality role from other important functions to clear organizational obstacles and road blocks and provide critical oversight of Six Sigma initiatives to ensure that expected returns are achieved.
- **Champions** – Six Sigma requires a champion especially as the discipline will potentially change the *modus operandi* of the firm. The Champion will be called upon to be the spokesperson, advocate or the outward face of the Six Sigma practice. The Champion must be willing to go anywhere to talk to anyone, at anytime, about Six Sigma, the benefits and the reality of quality initiatives under the wing of Six Sigma. The Champion may be a unique role within an organization, or undertaken by the Master Black Belt.

How does a typical Six Sigma project work? Figure 3.1, on the next page, outlines some of the major activities of a typical Six Sigma initiative.

The initial step in Six Sigma is the identification of the problem to be solved. One might say that the problem is a source of customer dissatisfaction, such as having recurring incidents due to a service being up and down. Another way to think about the starting point as an initiative that must be undertaken to move the organization forward. Whether solving a problem or moving along with a new project, there must be a clear reason for engaging Six Sigma and the valuable resources required for such a project.

Next is the need for executive support. This support may take the form of a sponsoring authority or the funding source. Senior level engagement is necessary as Six Sigma initiatives are not small undertakings.

What follows next is a focus on the scope of the Six Sigma effort. What part of the business or customer arena will be the target of investigation? Will the initiative be limited to one customer segment or is the intention to look broadly across all markets the organization serves? The key is that the scope of the initiative is aligned with a challenge that the customer – whether the ultimate customer of the business or an internal customer of IT, such as the financial group – believes improvement would serve their interests directly. In other words, the improvements can be clearly articulated in customer terms – both the initiative to secure the improvement as well as the end results.

At this point, the project is initiated, a project charter completed and appropriate funding has been allocated. Make no mistake: Six Sigma initiatives are projects and as such should be governed that way. Project management brings the necessary discipline to the forefront to ensure that resources are engaged appropriately, at the right time and that there is formal oversight of the improvement effort, possibly via a project steering committee. The project scope is, of course, stated in terms and will be targeted to improve aspects of an existing product, process or service, or possibly to introduce a new product, process or service. The bottom line is that a Six Sigma effort is formal and focused.

The Six Sigma discipline now moves into high gear, collecting and analyzing data and applying the Six Sigma practice disciplines. For simplicity's sake, the project illustrated in Figure 3.1 suggests this is a DMAIC effort, but this project could easily engage DMADV. However, whether we are speaking of DMAIC or DMADV, the project goal and its objectives are to improve the area within a customer-oriented scope; the results are tangible, measurable and will be reported.

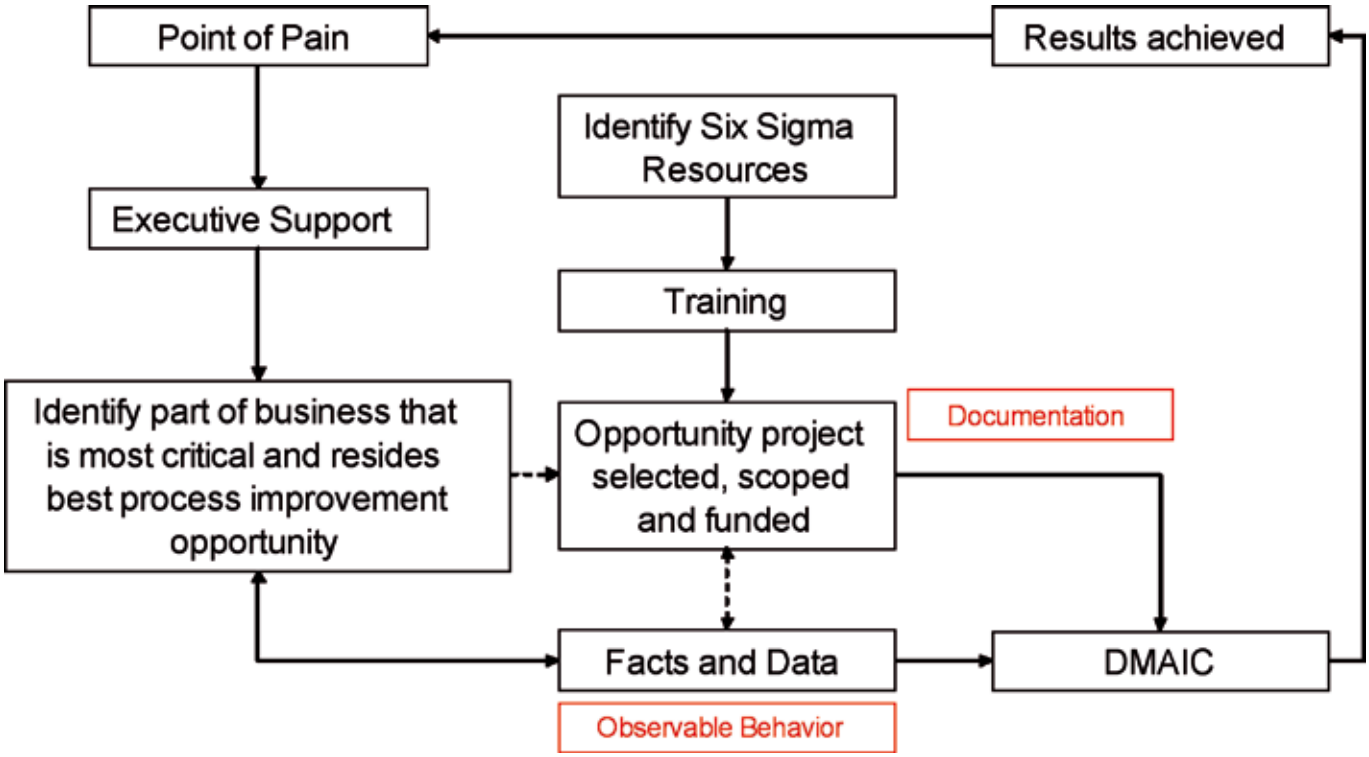

Figure 3.1 Activities of a typical Six Sigma initiative

As Service Management and the ITIL framework are now considered a lifecycle, so are improvement efforts. Thus, as one Six Sigma project is implemented and the benefits are realized, the operating business dynamic changes as well. These changes foster new opportunities for the next Six Sigma effort as the business climate changes, customer expectations evolve or any of the other myriad of business dynamics drives the need to look inward one more time to bring improvement to products, processes or services.

4 Application of Six Sigma to ITIL concepts

With a basic explanation now presented of Six Sigma and how it works, both mechanically and organizationally, a pressing question remains: how does Six Sigma apply to Service Management? Answering this question requires an evaluation of ITIL principles and how Six Sigma, as an improvement methodology, would provide value as a tool of the CSI practice. In addition, as Six Sigma relies extensively on process measurements, there must be agreed to and documented Service Management metrics and measurements that are accurate and consistently reported on. Let us take a look at some basic ITIL concepts developed as part of ITIL V3 and find some common ground to answer this question.

A basic premise of what sets Six Sigma apart from other quality efforts is the concept that all improvements are focused on the Voice of the Customer (VOC). In other words, Six Sigma does not undertake improvements for their own sake, but with the expressed intention of improving the customer experience – more specifically, improving the customer's interaction with the organizational products, services or processes consumed for the benefit of the customer.

So, the question is: is there a VOC concept within ITIL and if so, how would it apply?

The VOC can be considered at two levels. At the lower level, we should consider how the process or service, and the defects addressed by Six Sigma, are those that directly impact a firm's customers. Those defects could affect an organization's reputation or customer goodwill – thus the need to be very focused on customer-facing issues. At the higher level, we might also consider those issues that could impact the business strategy, objectives and goals. Clearly one could make the argument that the accumulation of customer-based issues will eventually impact business goals or objectives. In the end, the business is the customer of IT or the service provider. Therefore any issues, caused by the service provider, impacting the business would be within the scope of a Six Sigma investigation.

An important definitional note is needed here. As explained in the context of the VOC in Section 3, the concept of the customer is integral to the Six Sigma methodology and practice. In Six Sigma language, a customer is 'a person who receives the product or service of a process'.[1] However, in the ITIL language the term 'customer' defines 'someone who buys goods or services'[2] or the individual who has the chequebook. This individual may or may not be a user. ITIL defines 'user' as 'a person who uses the IT Service on a day-to-day basis'[3] or essentially the individual who relies daily on the product or service to support his or her daily activities.

For purposes of our discussions, we will use the term 'customer'. A customer is an individual or entity who consumes a service or a product that the ITIL processes support, and who has expectations or expected standards of performance relative to the service or product. It is when those expectations or standards of performance are not met that the VOC comes to the fore.

At the heart of understanding how Six Sigma applies to Service Management is the concept of a service. One of the most important and fundamental improvements in the recent ITIL version is the revised definition of a service: 'The means of delivering value to customers by facilitating outcomes customers want to achieve without the ownership of specific costs and risks'. This is a powerful concept, especially in light of the tenets of Six Sigma. Let us investigate several key words or phrases of the service definition and explore how they apply directly to Six Sigma.

The first idea is that a service is 'the means to deliver value to the customer'. Value implies that whatever we deliver to the customer, the customer finds of sufficient worth that they would be willing to exchange something of value (i.e. pay) for the delivered service. Of course, value is in the eye of the beholder and the degree of value can vary depending on who the customer is, their business circumstances, the availability of substitutes (e.g. outsourcing the Service Desk) for the service and so forth. The bottom line is that there is need on the part of the customer for the service and that they find it valuable.

The second and most important concept in relation to Six Sigma is that the service 'facilitates the outcomes customers want to achieve'. With this simple construct, the delivered service is inextricably linked to the internal processes, products or services of the customer. Thus, service improvements are clearly aligned with the customer or, in the words of Six Sigma, can be measured in terms of the VOC.

Therefore, the overall framework we employ to deliver these services, or Service Management, forms the scope for Six Sigma projects.

Services do not magically appear from the ether. They are delivered by the productive effort of service assets combining resources and capabilities in a productive way so as to deliver value for customer consumption.

1 www.isixsigma.com

2 Office of Government Commerce (OGC). Service Strategy. United Kingdom: The Stationery Office, 2007

3 *Ibid*

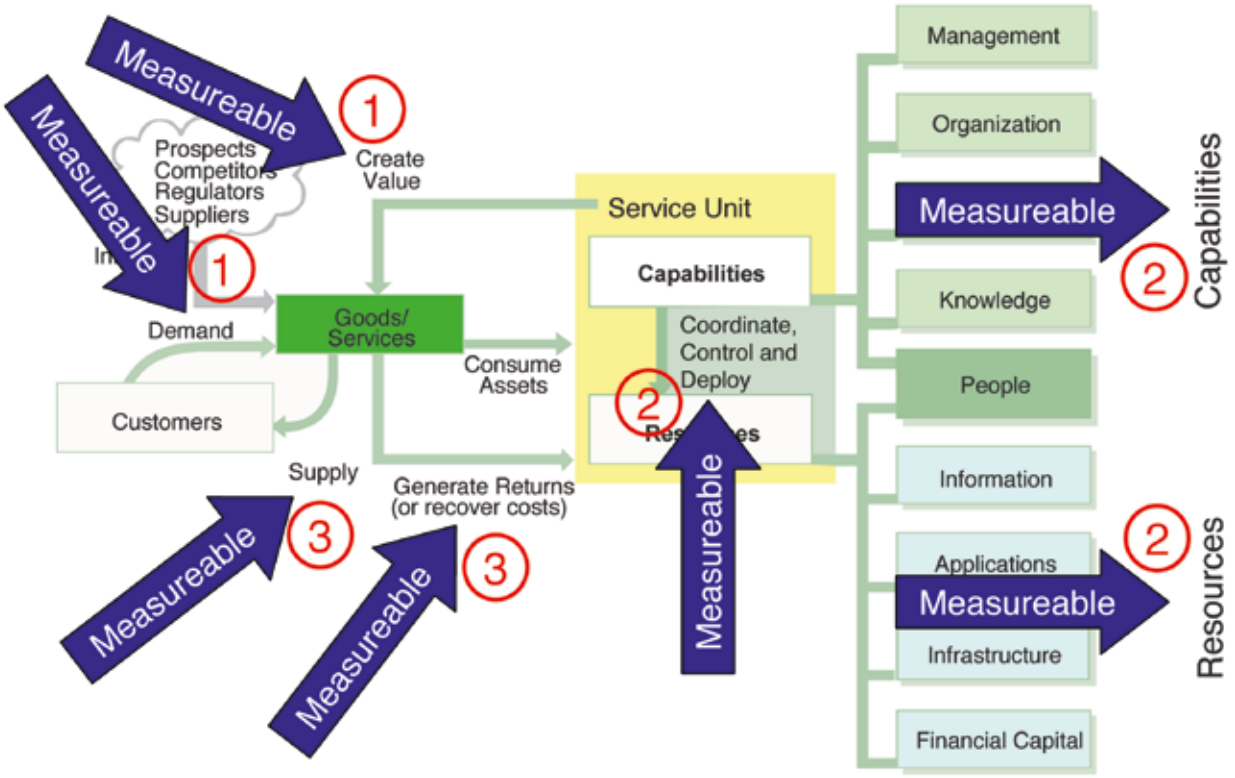

Figure 4.1 Possible sources for measurement

Adapted from Figure 3.9, Reproduced under licence from OGC. Business Units Are Collections of Goal Driven Assets, Service Strategy, Section 3.2.2.1

The lifecycle of the service and the interaction of the service asset with the customer are depicted in Figure 4.1 (this figure is based on Figure 3.9 in the ITIL *Service Strategy* publication). Although the value-creating nature of a service is called out in this diagram, what is most important, from a Six Sigma perspective, is that multiple sources for measurement are possible during the service cycle. Measurement is vital to any quality effort, but performance data-gathering through measurement is particularly necessary for Six Sigma. Let us look at several measurement 'stations' and discuss how they are helpful.

Station 1 – The measurement of the value delivered (or perceived to be delivered by the customer) and the visible demand for the service is the goal of VOC. The customer demands a service only if they believe the value of the service is worth demanding. Thus up or down trends in customer demand (and in turn perceived value) are important metrics. Customer perspectives relative to the intrinsic value of the product or service can be the focus for a Six Sigma problem statement.

Station 2 –The measurements contained within Station 2 in and of itself do not speak directly to VOC, but instead can be considered contributing factors (or potential sources of defects) that can directly influence the VOC. If the service organization or department is not effective or efficient in terms of how it brings together both resources and capabilities, value may be delivered, but at what cost to the organization or department? Or as is more likely the case, perceived value deteriorates over time due to the inefficiency or ineffectiveness of the service unit – a potential source for the Six Sigma problem statement.

The scope of the problem statement can also lie in the nature of the resources and capabilities. During the fact-gathering and analytic stages, a Six Sigma Black Belt might look to the service construct or the combination of resources and capabilities, their basic nature and the challenges associated with their eventual use by the service unit to deliver a service.

Station 3 – Ultimately, the service unit must meet the demand of the customer, as output from the service asset. As the supply is consumed by the customer, there is economic exchange with the service unit for the value delivered. For most IT organizations or departments, the 'value exchange' may not result in a profit, but at least the exchange should provide an ability for the service unit to recover production and delivery costs.

Measuring the ability of the service unit to meet demand and the adequacy of 'value exchange' are the final key measurement points for Six Sigma. Additionally, the service organization must have sufficient capacity to meet customer needs over the long haul. Again, both of these measurements can be considered more effect than cause, but they do serve as indicators of problems to be resolved, and they provide data for problem analysis and solution. Although Station 3 measurements could be considered secondary factors to the overall problem, shortcomings in either of the two can have significant impact

on the ability of the organization or department to sustain services over the long term – which of course would be a true issue for the customer.

One other ITIL concept must be understood, as it has a direct and immediate linkage to Six Sigma initiatives. This concept is how value is created.

Service Strategy states that the value of a service can **only** be achieved if both the utility and warranty of services are assured. To put it simply, service utility, or fitness for purpose, are the feature or function attributes of a service that have a positive impact on the customer. In other words, customer outcomes can be improved through the consumption of the service, as the service provides the features or functions required by the customer to support their value-adding process outcomes. It seems to go without saying that leveraging a service that will make the customer's life more efficient or effective would have value. But there is a caveat to the value equation – utility is necessary but not sufficient.

In addition to utility, the service must be delivered consistently over time – or with warranty (fit for use). To expand this concept, the customer can depend on the service to deliver the utility when needed and as needed. In the terms of IT Service Management, this consistency or warranty is defined or measured in terms of availability, capacity, security and continuity.

We integrate the concepts of utility and warranty in Section 5 as potential opportunities for improvement initiatives.

5 Integrating Six Sigma and ITIL to Achieve Continual Service Improvement

The key to improvement and a requirement of Six Sigma, is the ability to measure and report against the performance of processes, services or projects. Within the ITIL Continual Service Improvement book three different types of metrics – technology, service and process – are discussed. Organizations may also identify and report other metrics which support the operational, tactical or strategic goals or objectives.

All three forms of metrics are important, but the organizational emphasis on them is typically out of balance. Historically, in most IT organizations there has been more emphasis on capturing technology metrics, especially at the component level, and less emphasis on service metrics. But we have seen how technology metrics can be aggregated to present end-to-end service metrics; i.e. how the customer is experiencing the service. Of course, process metrics are typically lacking, especially at the outset of an ITSM process project. Organizations must consider capturing process metrics as part of the process initiative to at least form a process performance baseline or benchmark.

Over time, as these metrics are captured they can be used to report on the wellbeing of the target itself (for instance, a service could be assessed in terms of its ability to meet the needs of the business) and to identify potential improvement opportunities if the quality is lacking. The improvement opportunity could be the subject of a typical Six Sigma project.

In order to apply Six Sigma there is one basic requirement: it requires the existence of a process, or at least the intention to design one. Without the discipline and focus of the repeatability of a process, the Six Sigma methodology has little applicability.

Processes can be measured across four dimensions – value, quality, performance and compliance. Any of these dimensions could serve as the basis for a Six Sigma project, especially if one considers the impact of poor performance on the customer of the process.

Figure 5.1 below, shows a generic process model. By looking at this, we can identify certain areas that support the need for measuring the health of a process and how they can be tied to the four dimensions mentioned above.

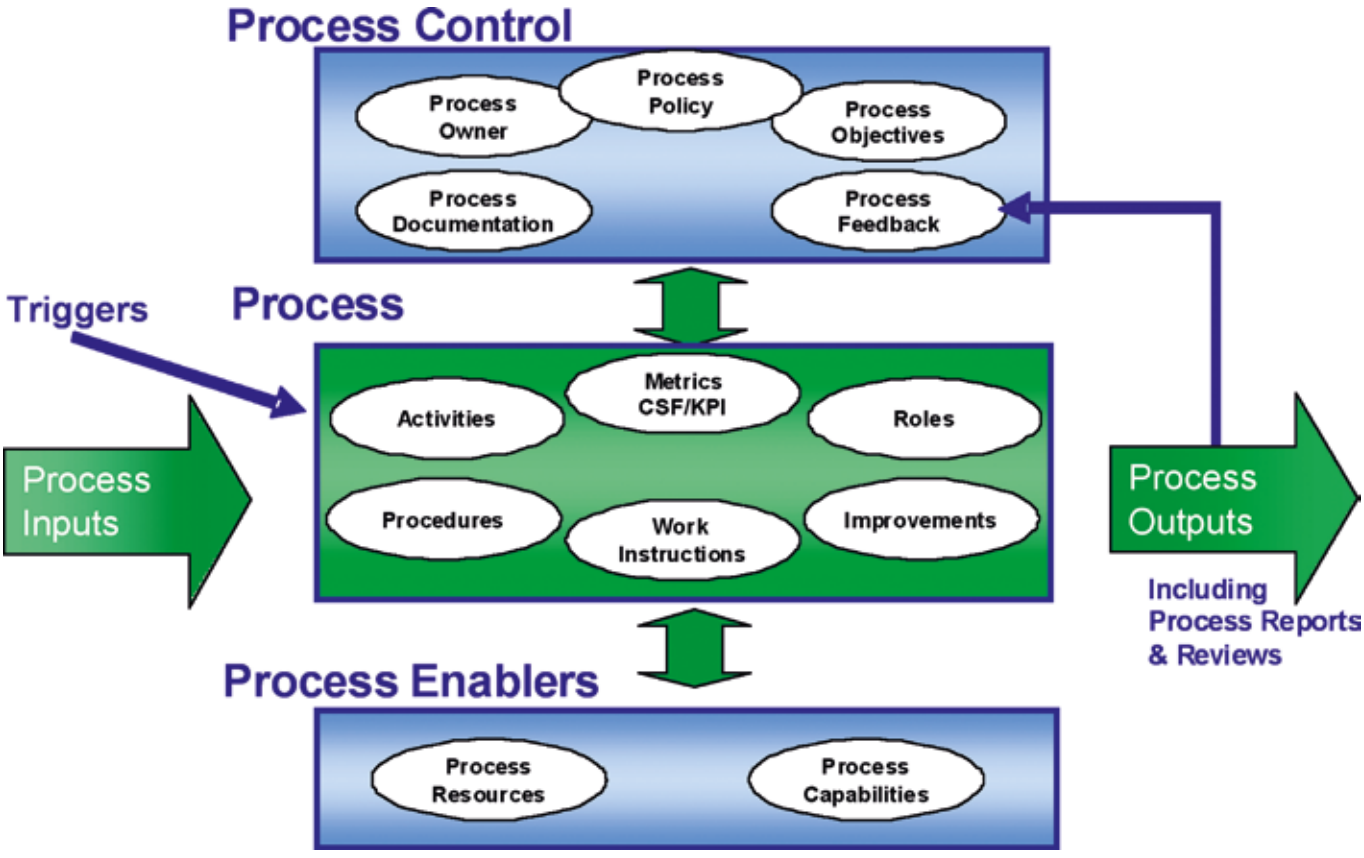

Figure 5.1 The generic process elements

Process control

Process objectives are defined and measured to ensure that the process goals and objectives are continually met. Also, the objective measurements provide information on whether the value has been delivered or the process is followed.

Process feedback is another measuring point to obtain process users' feedback on the efficiency and effectiveness of the process. This feedback can be an important source of information about the value, quality and performance of the process.

Process

Within the process activity space there are defined CSFs, KPIs and process activity metrics that can be measured on an ongoing basis. There should be a balance on how the KPIs support the CSFs and depending on what the KPI is, both can and should support one or more of the four dimensions of value, quality, performance or compliance.

Process enablers

It is important that an organization has adequate human and technology resources to capture, process and report on the different measures and metrics required to understand the health of a process and identify improvement opportunities.

Output

The output of a process will include reports with agreed measures and metrics, which are often reflected in a process scorecard. The output of a process will also help define whether the process is meeting its performance targets, such as measuring the efficiency of the process, or whether it is meeting a defined objective tied to its value and quality.

All of these process measurement sources are prime candidates for Six Sigma analysis.

The principal connection between ITIL and Six Sigma lies in CSI. As the 'primary purpose of CSI is to continually align and realign IT Services [and of course ITSM processes] to the changing business needs by identifying and implementing improvements to IT services', a technique such as Six Sigma would be at the heart of the purpose. There clearly should be alignment between CSI and the Six Sigma methodology, Analyzing the metrics discussed earlier with an eye to meeting or exceeding the needs of the customer.

Within the ITIL *Continual Service Improvement* publication a six-step Continual Service Improvement model and a 7-Step Improvement Process are defined and described. There is a tight linkage between the process and model and the two approaches to Six Sigma.

The six-step improvement model (shown in Figure 2.2 above) is far more useful to design and build new processes or services, as well as improve existing processes. Thus, it can be aligned with both the DMADV and DMAIC approach, as Table 5.1 shows.

Table 5.1 Aligning the Continual Service Improvement model to stages of DMADV and DMAIC

Continual Service Improvement model	DMADV	DMAIC
Vision and goals – Validating back to the business and IT vision, strategies, goals and objectives. Understanding business requirements	Define	Define
Where are we now? (creating a baseline) and **Where do we want to be?** – Setting targets for measurements such as CSFs and KPIs	Measure	Measure
Where do we want to be? and **How do we get there?** – Identify design options for process improvements	Analyze	Analyze
How do we get there? – Identify design options for process improvements	Design	Improve
Did we get there? – Verifying new results and whether we met the improvement objectives	Verify	Control
How do we keep momentum going? Is the organization (and individuals within it) embracing the new or improved processes?	Verify	Control

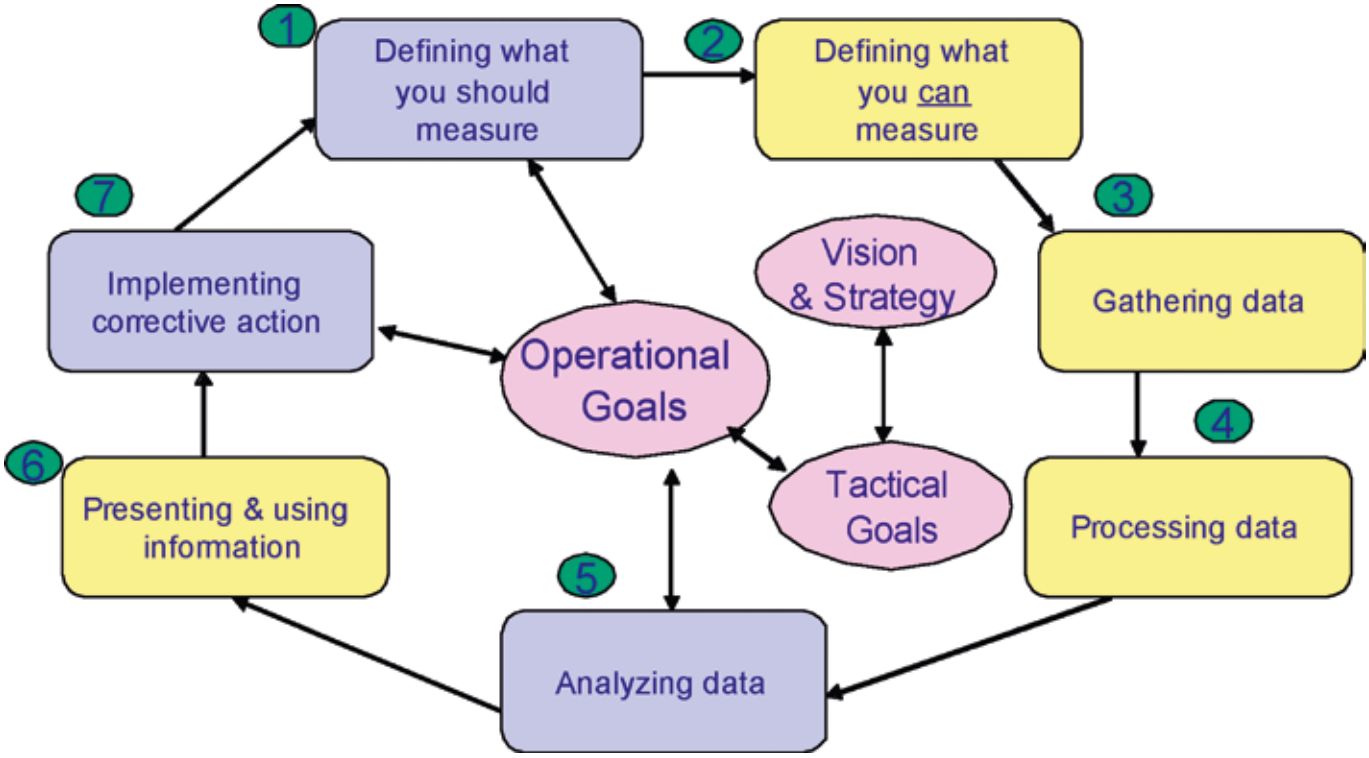

Figure 5.2 The 7-Step Improvement Process

Adapted from Figure 4.1, Reproduced under licence from OGC. 7-Step Improvement Process, Continual Service Improvement, Section 4.1

Table 5.2 Aligning the 7-Step Improvement Process to stages of DMADV and DMAIC

Continual Service Improvement Process	DMADV	DMAIC
Vision and goals – Validating back to the business and IT vision, strategies, goals and objectives	Define	Define
Steps 1, 2 – What should be measured, what can be measured	Define	Define
Step 3 – The gathering of measurement data	Measure	Measure
Step 4 – Processing the data	Measure	Measure
Step 5 – Analyzing the data and looking for trends and improvement opportunities. Also recommending areas for improvement	Analyze	Analyze
Step 6 – Presenting and using the information in the form of reports. Prioritizing improvement initiatives. Reports should allow an organization to make strategic, tactical and operational decisions	Analyze	Improve
Step 7 – Implementing the improvement initiative	Design	Improve
Operational and tactical goals – Ensuring that improvement opportunities support the new or changing business requirements	Verify	Control

There are numerous opportunities to exercise the improvement model within Service Management. Some examples would include:

- **Example Opportunity 1** – It is important to create an initial baseline measurement on the maturity, effectiveness and efficiency of a process. This provides the ability to measure improvement successes after improvement initiatives have been implemented. Many organizations often will not want to create an initial baseline until after the improvement initiative has been implemented; however, this makes it much harder to determine the amount of improvement that was made. Organizations may also say they do not have any good data, so why bother creating an initial baseline? In fact, bad data is better than no data, and this in itself is an improvement opportunity.

This maps to both DMADV and DMAIC as a part of the measurement activity.

- **Example Opportunity 2** – Creating targets for improvement. These could be improvement targets for process effectiveness and efficiency that will often be defined in the form of KPIs.

This maps to both DMADV and DMAIC as a part of the analyze activity.

- **Example Opportunity 3** – Did we get there? This is a measurement of the process, utilizing the defined KPIs to determine if the improvement results met the defined objectives.

This maps to the DMADV verify activity and to DMAIC as a part of the control activity.

The 7-Step Improvement Process can be easily aligned to the DMADV and DMAIC methods as well. It is useful itself in identifying the improvement opportunities of existing processes or services. Table 5.2 compares the stages of the process to the stages in sub-methodologies DMADV and DMAIC.

To sum up the concept of improvement opportunities and how DMAIC and DMADV could support improvement, one only needs to look at the concept of utility and warranty. If (and only if) IT can deliver the service with both utility and warranty prescribed in terms of what the customer needs, then (and only then) will value be delivered. Value, as expressed in terms of utility and warranty, is clearly at the heart of VOC.

This definition of value is important to applying Six Sigma to ITSM as a VOC construct. But another set of concepts bears noting as they play directly into the basic analytic practices of Six Sigma.

As noted in Section 3, Six Sigma applies underpinning statistical practices and techniques. Six Sigma, as an approach, draws its name from a statistical component (the sigma or standard deviation) of data distribution curves.

Interestingly, both utility and warranty can be expressed as data distributions and in turn can be subject to Six Sigma mathematics. Let us look at this.

Figures 5.3 and 5.4 depict both the utility and warranty performance of a service as distribution curves. Why would that be the case? Think about how services are delivered. Are results consistent again and again? Typically not. Instead, if we measure a service and the delivery of service utility and warranty precisely, we will find that the outcomes might be a little better or worse from time to time; however, the overall performance is somewhat consistent and clusters around an average (or mean). If we plotted the outcomes over time, we would arrive at curves very similar to those represented in Figures 5.3 and 5.4.

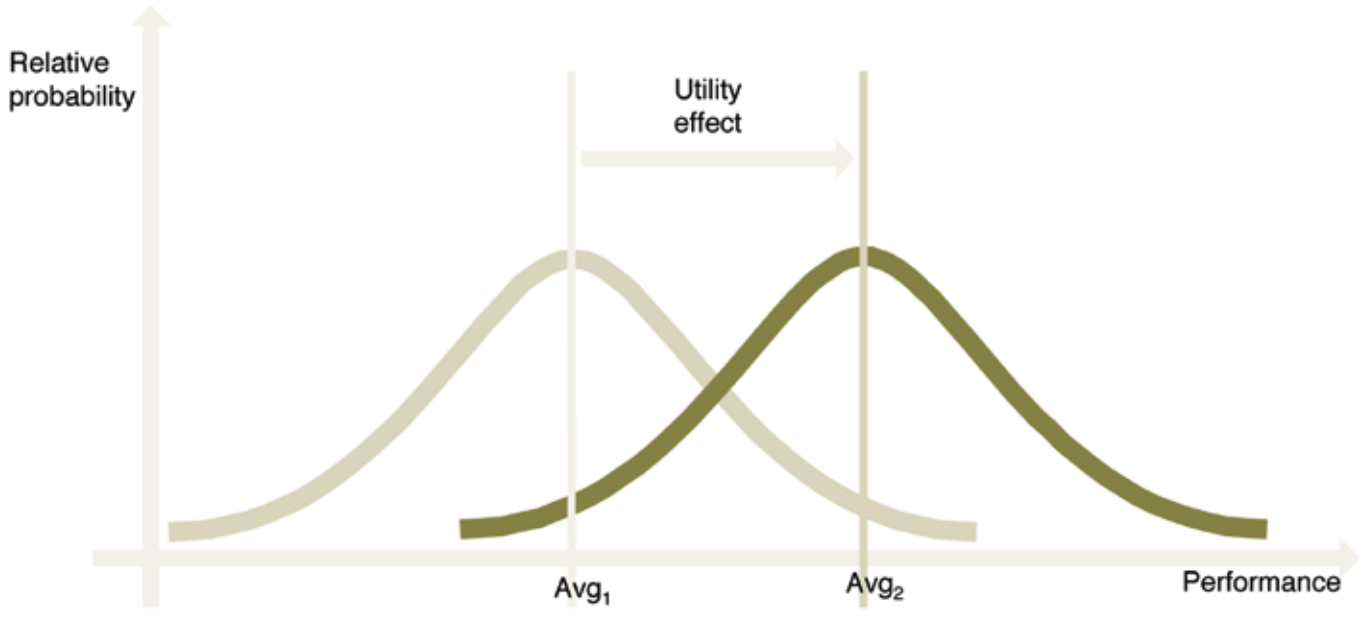

Figure 5.3 Utility increases the performance average

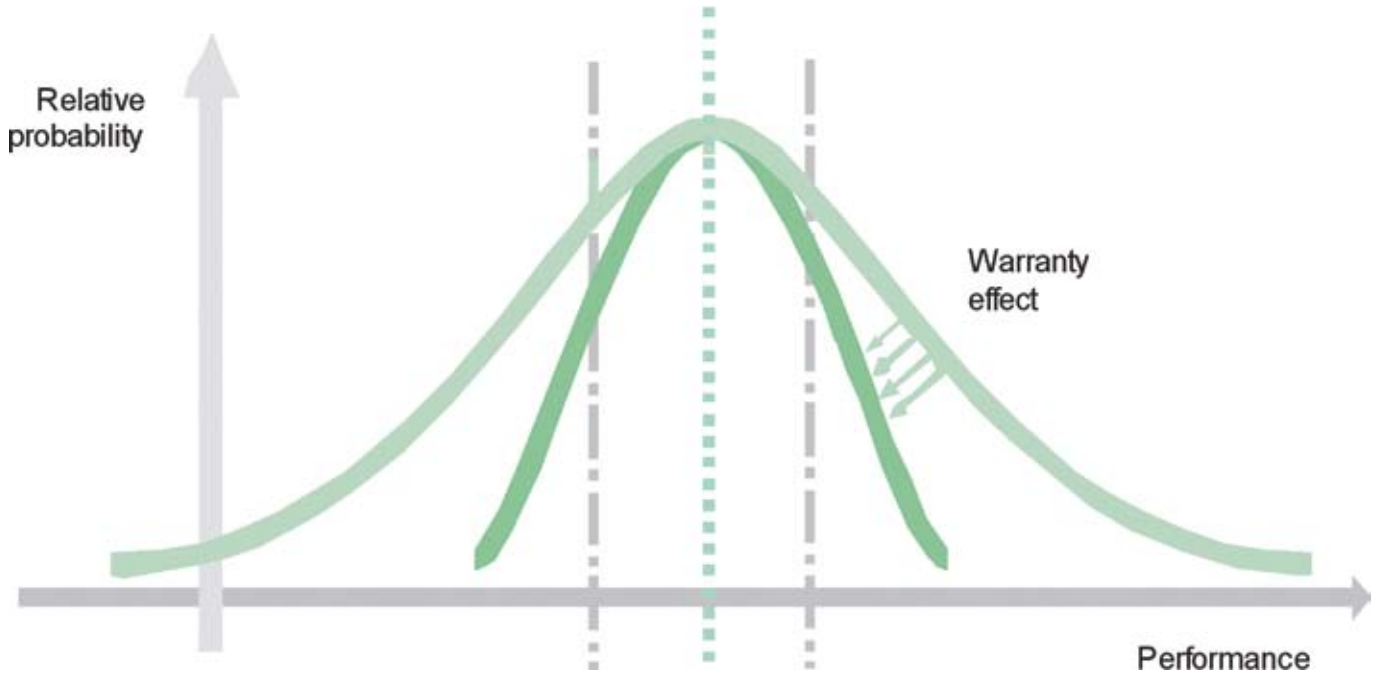

Figure 5.4 Warranty reduces the performance variation

If we plot the service performance graphically over time, we find that the performance data can be depicted graphically as a distribution curve. The curve will have some degree of symmetry around the average or mean. As service managers, we would prefer that the service perform as expected and as such, we would like to reduce variations in performance that might make the service or process more difficult to manage or impact customer processes.

What do these graphics suggest?

With respect to utility, IT can improve the performance of the organization to deliver provisioned features and functions that would be viewed positively by the customer. The shift in performance of utility is known as the 'utility effect'. The utility effect can be understood to be the impact to the customer of improving service or process performance through some improvement effort. If we improve the feature/function of a service or process then we would expect the average performance to also improve. If that is the case, then the distribution of performance would also shift in a positive direction.

The improvement project, whether using the six-step Continual Service Improvement model or the 7-Step Improvement Process, would seek to improve the performance without potentially impacting the current defect level or yield. After the utility effect is implemented one could address improving warranty.

There is a slightly different perspective when looking at warranty. Recall that delivering a service with warranty means improving the consistency of delivery over time. If that is the case, then it is expected that the distribution of results would 'tighten' up around the average – meaning that any inconsistency with respect to service delivery would 'shrink' and thus the distribution of service performance would become tighter or closer to the expected average performance. This tightening of the performance is known as the 'warranty' effect. Another way to think of the warranty effect would be removing the number of defects or improving the yield.

What does this mean to ITSM and service or process improvement? A major tenet of Six Sigma is that a service, process or product performance is measurable. Six Sigma uses statistical techniques (remember what a sigma stands for) and these curves depict that services, etc. can be measured statistically and can be subject to Six Sigma methods. Thus, as an organization is working towards improving a service or process, accurate measurements are not only important but also can be Analyzed critically to identify improvements and progress towards those improvements.

6 Aligning Six Sigma to IT Service Management

Let us bring all of these principles together and discuss where we would apply them.

First and foremost, there are some points within the lifecycle where Six Sigma principles can apply. The Service Portfolio is useful to this discussion (see Figure 6.1).

The Service Portfolio consists of the Service Pipeline and the Service Catalogue. Within the pipeline, decisions must be made to either introduce new services into the Service Catalogue or to improve existing services. These decisions will lead to specific design and implementation practices, as the new or improved service moves from concept to reality. Six Sigma provides a statistically based approach to supplement the typical approaches to the decision, design and implementation activities that result in more consistent processes and process improvements.

As we discussed earlier, DMADV is useful to implement the design decisions emanating from Service Strategy and brought to fruition in Service Design and Transition. DMAIC, on the other hand, will underpin the improvement decision process, focused through Continual Service Improvement, as either a primary or supplemental improvement identification and decision technique.

In either case, Six Sigma can be applied directly by the ITSM practitioners in managing the service or process design, build and implementation activities as well as the improvement efforts of the organization.

The ITIL processes themselves can also support Six Sigma activities. Tables 6.1 and 6.2 suggest which ITIL processes might be useful to provide either performance data for completing Six Sigma analysis or useful techniques and practices that can supplement or be supportive of Six Sigma methods.

For instance, when applying DMAIC, we seek to define a Six Sigma problem. Service Level Management (SLM) would be useful in the Six Sigma 'Define' step. One aspect of SLM is to monitor and, if necessary, address the performance, or lack thereof, of services to meet the needs and expectations of the customer (business). In the event that service performance does not consistently achieve the expected service levels, a

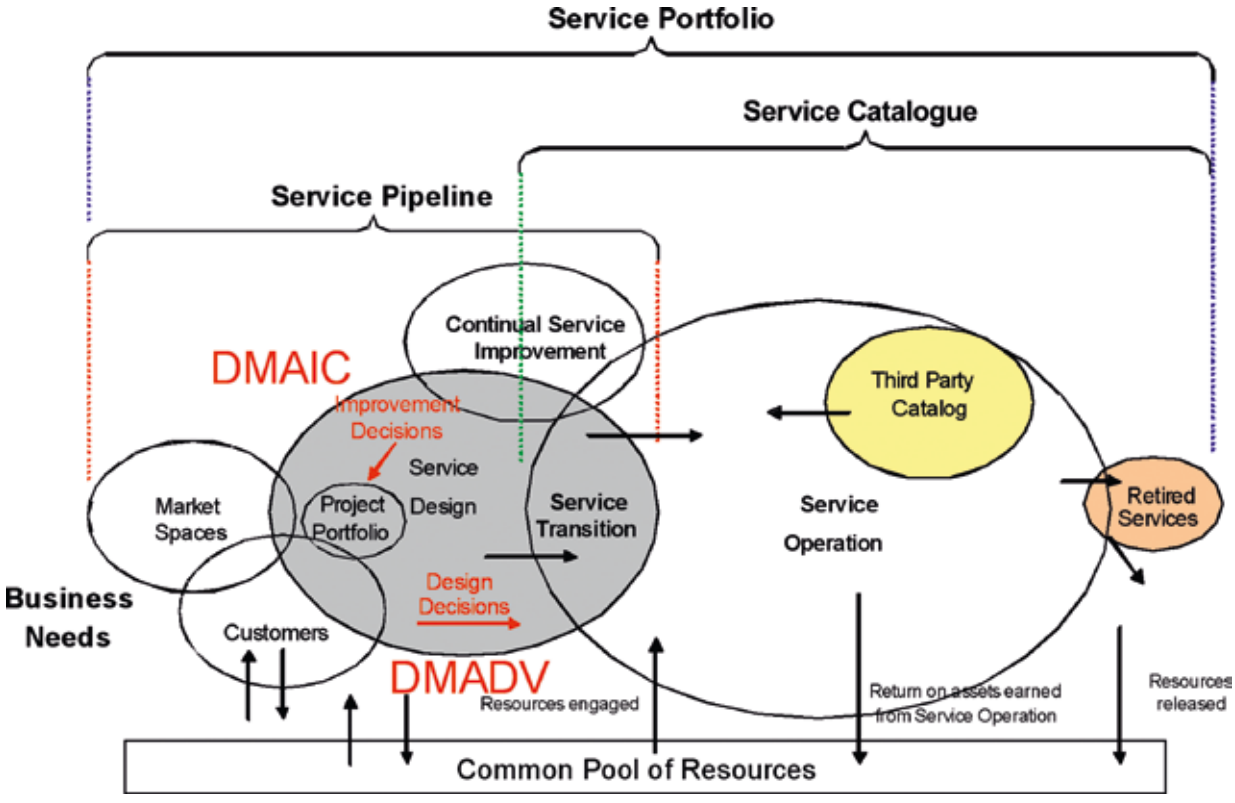

Figure 6.1 The Service Portfolio, DMADV and DMAIC

Adapted from Figure 4.11, Reproduced under licence from OGC Service Pipeline and Service Catalogue, Service Strategy, Section 4.2.3

Service Improvement Plan may be developed. Six Sigma could supplement the work of SLM in understanding and Analyzing the underpinning issues associated with the service deficit. SLM would be useful in defining a customer-specific Six Sigma problem. In other words, the Six Sigma problem could be defined in terms of the service issue raised by SLM or Six Sigma will be helpful in sorting out true service-related issues.

Tables 6.1 and 6.2 depict the author's perspective of ITIL processes and their application to and support of Six Sigma practices.

Another, broader approach would be to align Six Sigma's DMAIC and DMADV to the overall service lifecycle. DMAIC, owing to its intrinsic focus on improvement, broadly spans the lifecycle, whereas DMADV can be aligned quite well with the development of new services. Table 6.3 depicts the nature of the Six Sigma and Service Management lifecycle.

Table 6.1 ITIL processes and their application to Six Sigma's DMAIC

DMAIC	ITIL processes
Define	Service Level, Service Strategy, Demand, Transition Planning and Support, 7-Step Improvement Process
Measure	Event, Incident, Service Level, Availability, Capacity, Sevice Request, Supplier, Information Security, 7-Step Improvement Process
Analyze	Problem, Service Asset and Configuration, Financial, Service Portfolio, Availability, Evaluation, Capacity, Information Security, IT Service Continuity, Event, 7-step Improvement Process
Improve	Release and Deployment, Requirements Engineering, Transition Planning and Support, Service Validation and Testing, Change, Evaluation, 7-Step Improvement Process
Control	Service Level, Supplier, Availability, Capacity, Information Security, Governance, 7-Step Improvement Process

Table 6.2 ITIL processes and their application to Six Sigma's DMADV

DMADV	ITIL processes
Define	Service Level, Service Strategy, Requirements Engineering, Availability, Capacity, Information Security, IT Service Continuity, Transition Planning and Support, 7-Step Improvement Process
Measure	Event, Incident, Availability, Capacity, Service Request, Supplier, Security, 7-Step Improvement Process
Analyze	Availability, Capacity, Information Security, IT Service Continuity, 7-Step Improvement Process
Develop	Release and Deployment, Transition Planning and Support, Service Validation and Testing, 7-Step Improvement Process
Verify	Service Validation and Testing, Service Level, Availability, Capacity, IT Security, IT Service Continuity, Evaluation, 7-Step Improvement Process

Table 6.3 Six Sigma and the Service Management lifecycle

Lifecycle stage	DMADV	DMAIC
Strategy	Define	Define
Design	Define/Measure/Analyze	Measure/Analyze/Design
Transition	Design/Verify	Improve
Operation	Verify	Control
Continual Improvement	Verify	Define/Measure/Analyze

7 Tips, Tricks and Traps

As with any framework, standard or model, one must keep in mind that every organization is different. Implementing ITIL or Six Sigma for the sake of it could be a slippery slope. There must be a valid sense of urgency as to why an organization undertakes the effort to implement the Six Sigma discipline. Also, when implementing ITIL or Six Sigma it is important to implement for 'fitness for purpose', or what makes sense for the organization. Organization-specific Six Sigma implementations will have different resources to support the initiatives, different budget levels, etc. Remember that one size does not fit all.

One of the major challenges of implementing Six Sigma to support ITIL is the demand made on a common pool of resources. This competition for resources is very typical when multiple projects are ongoing. Each project wants to have the best of the best on the project team.

To address these issues, the following tips should be taken into consideration when implementing ITIL and Six Sigma:

- Both ITIL and Six Sigma initiatives will require senior management support and participation. This involves not only providing a budget, but also ensuring the right skilled resources are available and allocated to the projects.
- ITIL and Six Sigma should focus on the customer and not necessarily IT. So, it is important to understand the customer needs and listen to the VOC.
- ITSM is about defining and managing services, so it is important to define and publish a Service Catalogue and also understand how the Service Catalogue fits into the larger Service Portfolio. Define how investment decisions are made to help the organization transform itself, grow the business, maintain the status quo or retire services.
- Create a process governance structure with clearly defined roles and responsibilities to ensure that there is continual validation of projects back to the business vision, strategy, goals and objectives. Process governance should also ensure the proper CSFs and KPIs are being measured and reported on to identify improvement opportunities.
- Implementing ITIL and Six Sigma will require the organization to move towards an organization-wide process orientation and away from managing individual groups or functional silos.
- Continue to develop the necessary skills and competencies to support ITIL and Six Sigma. ITIL Experts and Black Belts should be considered an organization profession.
- Be sure that proper procedures, tools and resources have been put in place to capture, process and Analyze the data; however, avoid getting caught in the typical trap of 'analysis paralysis'.
- Define the tools required to support the ability to capture, process and Analyze data. Six Sigma will require statistically oriented analytic tools to do the data 'crunching'. There are many fine tools on the market, but secure the one that best meets the needs of the Six Sigma practitioners – this is a special skill set. Then, of course, implement the appropriate tools as required.
- Implementing ITIL and Six Sigma will require a strong project management discipline. In fact, implementing ITIL usually requires overall programme management to manage the multiple projects that will be required. For further programme management information see the OGC publication *Managing Successful Programmes*.
- Managing organizational change is the number one issue that must be addressed. Failure to do so is a significant reason why projects of this nature fail.
- Neither ITIL nor Six Sigma is a 'silver bullet' that will solve all the problems the organization has today or in the foreseeable future. Six Sigma helps you define and understand your problem.

8 Conclusion

Organizations often ask if they should implement Six Sigma or ITIL, and the answer is 'Yes!' It is not about choosing one or the other, but understanding how they complement and collaborate with one another. The only competition is the competition for resources, as mentioned above.

As the ITIL service lifecycle runs its course, the processes and activities of the lifecycle provide a wealth of data necessary to support the design, management, build, implementation, operation and eventual retirement of the service. It is this data that can form the building blocks for the Six Sigma practices.

ITIL processes, at their most detailed level, are a rich source of information. In casting about for Six Sigma projects, one could look to the ITIL processes in the following areas:

- Process activities that need to be executed
- Process inputs and outputs
- Roles and responsibilities associated with each process
- Management information such as KPIs.

Using Six Sigma to supplement the management of ITIL processes and support the ITSM practices makes great sense. Six Sigma is process-oriented and as such can provide a focus on process or service aspects that may not be obvious to the casual observer; however, Six Sigma, as we suggested earlier, is not the cure of all process or service ills. It must be wisely and judiciously implemented. ITIL and Six Sigma will help the service organization meet the needs of customers today and into the future.

9 About the authors

Jack Probst

Jack Probst has a diverse management, business and technical background, and he delivers strategic process consulting and advanced ITIL training and education programmes as a Principal Consultant for Pink Elephant. An ITIL Expert, Jack previously served as the leader of an ITIL implementation initiative at a Fortune 100 organization. He also possesses decades of experience in IT process development and implementation, IT and business strategic alignment, business operations and general management. Additionally, Jack is a seasoned speaker and graduate-level educator, and is a member of the (*it*SMF) Academic Subcommittee that was recognized with the 2007 Industry Knowledge Contribution Award.

Gary Case

Gary Case is the co-author of ITIL V3's **Continual Service Improvement** core volume, and is an IT professional with more than 30 years of experience. As a Principal Consultant and ITIL Expert, currently the highest ITIL V3 certification, Gary specializes in providing strategic process consulting, business alignment, project management, and training to IT professionals across all industries. He also presents ITSM and ITIL-related sessions to audiences at major events worldwide. Gary joined Pink Elephant after successfully running his own consulting and training company, and serving as the Director of Training for Help Desk Institute (HDI).

Reviewers

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